

We claim:

- Sub AB  
Sub B(1)
1. A method for altering permeability, cell viability or structural integrity of biological materials comprising
    - (a) administering acoustic energy to the biological materials at one or more frequencies;
    - (b) measuring the effect of the acoustic energy or a property of the acoustic energy at the time of or subsequent to the initial application of the acoustic energy; and
    - (c) using the measurement obtained in step (b) to modify continued or subsequent application of acoustic energy to the biological materials. .
  2. The method of claim 1 wherein the property of the acoustic energy being measured in step b is one or more properties selected from the group consisting of pressure at one or more frequencies, energy input at one or more frequencies, and length of time the acoustic energy is administered.
  3. The method of claim 1 wherein the acoustic energy is effective to alter permeability of the biological materials to a chemical or biological agent selected from the group consisting of peptides, proteins, sugars, polysaccharides, nucleotides, polynucleotide molecules, synthetic organic compounds, synthetic inorganic compounds, and combinations and aggregates thereof.
  4. The method of claim 3 wherein the agent is in a form selected from the group consisting of cells or virus particles, nano or microparticles, liposomes or other lipid vesicles or emulsions.
  5. The method of claim 3 wherein the chemical or biological agent is delivered to cells or tissue.
  6. The method of claim 3 wherein the chemical or biological agent is detected or quantitated, further comprising
    - removing biological fluid or molecules simultaneously, previously, or subsequently to the application of acoustic energy, and
    - assaying the biological fluid or molecules to detect or quantitate the chemical or biological agents.
  7. The method of claim 1 wherein the acoustic energy is

administered to kill cells.

8. The method of claim 1 wherein the biological materials are made more permeable by the exposure to acoustic energy.

Sub 4 9. The method of claim 8 wherein the increased permeability is partially or completely reversible.

10. The method of claim 1 wherein the biological materials are biological membranes.

11. The method of claim 1 wherein the biological material is skin.

12. The method of claim 1 wherein the acoustic energy is applied to biological materials in an amount effective to disaggregate or dissociate the materials.

13. The method of claim 1 wherein the biological materials are blood vessels.

14. The method of claim 1 wherein the acoustic energy is applied at a frequency between 1 kHz and 10 MHz.

15. The method of claim 1 wherein the acoustic energy is ultrasound.

16. The method of claim 1 wherein the acoustic energy is applied at a peak positive pressure of up to 100 atmospheres.

Sub 5 17. The method of claim 1 wherein the application of acoustic energy causes cavitation within or on the surface of the biological materials.

18. The method of claim 1 further comprising administering an agent to enhance transport within or permeability of the biological materials.

Sub 6 19. The method of claim 1 wherein the acoustic energy or pressure is measured at one or more frequencies other than the frequency or frequencies at which the acoustic energy is applied.

20. The method of claim 1 wherein the acoustic energy or pressure is measured at a frequency or frequencies corresponding to integer multiples of one-half or one-fourth of the frequency applied.

21. The method of claim 1 wherein the acoustic energy is measured at one or more frequencies which do not correspond to peaks in the acoustic spectrum and are taken from the broadband signal of the spectrum.

22. The method of claim 19 wherein the acoustic energy measurement is analyzed using a mathematical algorithm, such as Fourier Transform or the Fast Fourier Transform.

23. The method of claim 1 wherein the application of the acoustic energy is modified by changing an acoustic parameter selected from the group consisting of pressure, energy, frequency, pulse length, total exposure time, duty cycle, and combinations thereof.

24. The method of claim 1 wherein the application of the acoustic energy is modified by changing a non-acoustic parameter selected from the group consisting of temperature, fluid gas content, administration rate of molecules to be transported, sample collection rate, device position, and combinations thereof.

25. The method of claim 1 wherein the application of the acoustic energy input is modified by interrupting the application.

26. A device for use in the method of any of claims 1-25.

27. A method for altering transport of chemical or biological agents into or through biological materials or cell viability in a human or other animal using acoustic energy, wherein the biological materials or cells are at a site distant from the site of application of the acoustic energy, comprising:

administering acoustic energy at one or more frequencies by applying a transducer to a first site on the human or other animal;

wherein the acoustic energy alters transport or cell viability at a second site in the human or other animal distant from the first site.

28. The method of claim 27 wherein the first site is skin or a mucosal membrane and the second site is at an internal organ, tissue or vessel.

29. The method of claim 27 wherein the cells are tumor cells.

30. The method of claim 27 wherein the acoustic energy alters transport of molecules selected from the group consisting of therapeutic, prophylactic and diagnostic agents.

31. The method of claim 27 wherein the transducer is directly

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applied to a tissue other than the biological materials where transport or cell viability is to be altered.

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